In that paragraph, Examiner states that "transformer T2 of Rhoads is not an ideal transformer" and that "All transformers have leakage inductance in their windings, some more, some less. See, for example, an example of this in Zansky".

Applicant agrees with Examiner's assertion to the effect that all transformers have leakage inductance; which is quite obvious in that even the smallest piece of connection wire has some inductance. In fact, even capacitors have inductance -- just as inductors have capacitance.

Moreover, Applicant does not dispute the fact that a transformer can be made to have substantially any degree of leakage inductance.

But these basic facts are not relevant to the issue at hand. Rather, the issue that needs to be resolved is that of determining if Rhoads employs leakage inductance as a manifest factor in his circuit. Thus, key questions are: Does leakage inductance provide a substantive effect in Rhoads circuit? Does his circuit operate properly without leakage inductance? --- The answers to these questions are NO and YES, respectively. In fact, his circuit operates properly only on the basis that leakage inductance is substantively negligible.

And, of course, there is no indication in Rhoads' specification to the effect that leakage inductance constitutes any kind of useful or necessary or substantive element of his circuit.

In respect to the Zansky example: Zansky overtly states that he employs the leakage inductance of a transformer; and, from his specification it is clear that this leakage inductance indeed constitutes a substantive element of his circuit. In fact, it constitutes a critical element: his very invention depends on the use of leakage inductance in lieu of an ordinary discrete inductor.

Hence, claims 118 and 122, which both calls for an inductor to be connected in circuit between "said center-tap and said mid-point" can not be rejected on a "102" basis as having been anticipated by Rhoads, since Rhoads does not indicate the required or manifest or substantive presence of such an inductor. Yet, when read in light of the specification, it is clear that in Applicant's circuit, the inductor referred to in claims 118 and 122 does indeed contitute a manifestly substantive element. In fact, his circuit would not operate without it.

Thus, in view of the above arguments, Applicant traverses Examiner's rejection of claims 118 amd 122.

Never-the-less, to further amplify the difference between Rhoads and Applicant's claims 118 and 122, Applicant hereinbelow amends his claims to that effect.

In re claims 120 and 121

[illegible] being within limits of the "broadest reasonable interpretation" of Rhoads circuit. Hence, Applicant hereinbelow amends his claims 120 and 121 so as to clearly differentiate over Rhoads.

In re claims 124-128

Examiner rejects claims 124-128 under 35 U.S.C. 112, second paragraph, and states that "the claims are misdescriptive".

Applicant traverses Examiner's rejections for the following reasons.

In support of his rejection, Examiner states that "the 'self-oscillating' frequency of the inverter is precisely the same as the switching frequency of the transistors". Applicant agrees with that statement, but does not understand its relevance. In connection with claims 124-128, Applicant simply does not use the term "switching frequency of the transistors".

On the other hand, what Applicant does use are in effect the following two terms:

i) "self-oscillation frequency of the inverter", which is the actual frequency at which the inverter operates; and

ii) "natural resonance frequency of the inductor-capacitor combination", which is simply the frequency at which the inductor-capacitor combination would oscillate if interacting with one another but without the interference of external factors.

Essential aspects of claims 124-128 relate to the relationship between these two frequencies; and, to appreciate the very significant difference between these two frequencies, Examiner is asked to review Applicant's explanation provided in the last three paragraphs on page 5 of Applicant's <u>APPLICATION FOR CONTINUATION</u>, which was filed on 11/23/83.

To re-iterate:

a) The self-oscillation frequency of the inverter (which is indeed the same as the switching frequency of the transistors) is determined by the frequency with which the switching transistors are turned ON and OFF; and which, in turn, is determined to a substantial degree by the saturation (or timing) characteristics of the saturable feedback transformers 47 and 49 of Applicant's Fig. 2;

b) The natural resonance frequency of the series-combination of the inductor and the capacitor is determined by the product of the inductance of the inductor and the capacitance of the capacitor, and is therefore a purely theoretical entity. It certainly has nothing to do with the saturation characteristics (or the timing characteristics) of the saturable feedback transformers, or with the frequency of the voltage that is applied to this series-combination.

- Examiner also makes the statement that "to distinguish between the inverter self-oscillating frequency and the natural resonant frequency of the LC circuit is misdescriptive, the frequencies being equal to each other". In light of the explanation provided just above, it should be clear to Examiner that the two frequencies are indeed not "equal to each other" except under very special circumstances.

The inverter's self-oscillation frequency is determined by a combination of the effect of the natural resonance frequency of the LC series-combination and the saturation (or timing) characteristics of the saturable feedback transformers. Except for the very special condition of having the timing characteristics of the saturable feedback transformers match the cycle-period of this natural resonance frequency, the inverter's self-oscillation frequency is different from the natural resonance frequency of the LC series-combination.

In other words, in his invention Applicant uses two different and independent timing means for determining the inverter's self-oscillating frequency, namely the saturable feedback transformers and the LC series-combination; and the resulting inverter self-oscillation frequency is determined as a composite of the timing characteristics of these two independent timing means.

In fact, an important aspect of Applicant's invention is based on the notion of making the inverter's self-oscillating frequency be different from (specifically: higher than) the natural resonance frequency of the LC series-combination.

To prevent destruction of the inverter's transistors, however, it is necessary that the timing naturally provided by the saturable feedback transformers be not longer than the timing naturally provided by the LC series-combination.

Examiner objects to claims 124, 127 and 128 as being multiplicative.

Applicant can reasonably accept Examiner's objection; and, to overcome this objection, Applicant hereinbelow amends his claim 127.

AMENDMENTS TO CLAIMS

118. (Amendment) In an inverter adapted to be powered from a DC source having a center-tap and to provide an AC voltage output, said inverter comprising a pair of alternatingly conducting switching transistors connected by way of a mid-point in series [illegible] said AC voltage output being provided between said center-tap and said mid-point, the improvement comprising:

a series-connected combination of an inductor and a ~~capacitor connected between said center-tap and said mid-point,~~ said series-connected combination having a natural resonance frequency that is not higher than the fundamental frequency of said AC voltage and being operative to cause current drawn from said AC voltage output to be substantially sinusoidal in waveshape;

means to permit connection of a load in circuit with said series-connected combination; and

a diode means connected across each of said transistors;

thereby permitting the inductor and the capacitor to: i) receive energy from the DC source by forward conduction of the transistors, and ii) return energy to the DC source by forward conduction of the diodes.

120. (Amended) In an inverter adapted to be powered from a DC source having a center-tap and to provide an AC voltage output, said DC source being powered by way of rectifier means from two power line terminals connected with an ordinary electric utility power line, said inverter comprising a pair of alternatingly conducting switching transistors connected by way of a mid-point in series across said DC source, said AC voltage output being provided between said center-tap and said mid-point, the improvement comprising:

[load] means for connecting an external load in circuit [connected] between said center-tap and said mid-point in such a way that one side of this external load is directly connected with said center-tap, said external load consuming substantially all the power being provided by said AC voltage output; and

connect means connecting said center-tap with one of said power line terminals.[;]

[whereby one side of the load means is directly connected with one of said power line terminals.]

#2 Cancel

121. (Amended) A frequency converter means adapted to be powered from a pair of input terminals connected with an ordinary electric utility power line and operative to provide substantially all of its output power to [a] an external load in the form of an AC voltage of frequency substantially higher [illegible] on said power line, said frequency converter comprising:

rectifier-filter means connected in circuit with said pair of input terminals and operative to function as a center-tapped source of DC voltage, said source's center-tap being connected directly with one of said input terminals;

a pair of alternatingly conducting switching transistors connected by way of a mid-point in series across said center-tapped source of DC voltage and operative to provide said AC voltage between said mid-point and said center-tap; and

connect means operative to connect the external load between said mid-point and said center-tap;

whereby one side of said external load is directly connected with one of said input terminals.

122. (Amended) In an inverter adapted to be powered from a DC source having a center-tap and to provide an AC voltage output, said AC voltage being of substantially trapezoidal waveshape, said inverter comprising a pair of alternatingly conducting switching transistors connected by way of a mid-point in series across said DC source, said AC voltage output being provided between said center-tap and said mid-point, the improvement comprising:

a series-connected combination of an inductor and a capacitor connected between said center-tap and said mid-point, said series-connected combination having a natural resonance frequency that is not higher than the fundamental frequency of said AC voltage but yet being operative to cause a substantially sinusoidal current to flow through said combination in response to said AC voltage; and

means to permit connection of a load in circuit with said capaitor.